REMARKS

Reconsideration of this application in view of the foregoing amendments and the following remarks is respectfully solicited.

The terminology used for the various intermediate articles that result from the practice of different steps of the claimed invention has been amended throughout the specification and claims to make it consistent. Several typographical errors have been corrected. The title and abstract have been amended to reflect that the elected claims are drawn to a method. The corresponding patent number for the serial number set forth at line 20 on page 4 has been inserted. The non-elected claims have been withdrawn.

No new mater has been introduced. The terminology, "carbon fiber-carbon matrix reinforcement" appears in the original specification at, for example, p. 6, Lns. 1-4. The "carbon infiltration technique" terminology appears at, for example, p. 7, Lns. 14-16. The terminology with respect to the matrix of sacrificial carbon around the bundles and its reaction to form metal carbides appears at, for example, p. 7, Lns. 18-26.

The rejection of claim 13 under Sec. 112 for using the language "stoichiometric excess" is respectfully traversed. This phrase is widely used throughout the chemical arts to define a situation where there is an excess of one chemical reactant as compared to that which is required for a complete reaction according to a balanced chemical reaction equation. For example, according to the simple chemical equation for the reaction of sodium with water ($2Na + 2H_20 = 2NaOH + H_2$) if more than two moles of water are present, there is said to be a stoichiometric excess of water. Attention is respectfully invited to the definition of "Stoichiometric" as it appears in

Webster's Third New International Dictionary, a copy of which is attached hereto as Exhibit A. This definition is as follows:

> "b: characterized by or being a proportion of substances or energy exactly right for a specific chemical reaction with no excess of any reactant or product..."

The phrase "stoichiometric excess" is commonly used in patent claims to define an excess of one reactant. A search in the US Patent and Trademark Office Database using the search string "ACLM/"stoichiometric excess" "shows that this phrase appears in the claims of 1424 patents. A copy of the first page of these search results is attached as Exhibit B. This phrase is commonly used in technical articles. See, for example, the second line in the abstract for a technical article that is attached hereto as Exhibit C.

The rejection of Claims 1-13 as unpatentable over Hecht 5,705,008 ('008) is respectfully traversed. One fundamental point in considering the teachings of Hecht '008 is that you would never end up with a "carbon fiber-carbon matrix reinforced ceramic composite" following the teachings of this patent. Practicing your Applicants' claimed method results in the formation of a composite in which the reinforcement in the carbide matrix is itself a composite. The reinforcement composite is a carbon fiber-carbon matrix composite. The reinforcement is embedded within a carbide matrix. The carbide matrix is formed by the reaction of sacrificial carbon with molten carbide forming metal. The reinforcement composite is protected from reaction with the carbide forming metal infiltrant by the sacrificial carbon. If this reinforcement composite were not so protected the carbide forming metal would react with it and the whole composite would be metallic carbide.

Pressurless melt infiltration of carbide forming metals is not taught or suggested by Hecht '008. The use of this step in the claimed method significantly reduces the cost of making a composite article.

There are several claimed aspects to the present invention that are not to be found in this patent. There is no teaching or suggestion of pressurless melt infiltration with a carbide forming metal having a melting point above 1850 degrees centigrade that reacts with CVD deposited sacrificial carbon. The infiltration metals disclosed by Hecht '008 (Col. 12, Lns. 6-11) are all low melting, and they are taught to form "metal matrix composites". That metal-carbon fiber composites (not metal carbide-carbon fiber composites) are what Hecht '008 teaches is made clear in Example 9, Col. 18, Ln. 60 through Col. 19, Ln. 2 ("copper-carbon fiber composite", "nickel-carbon fiber composite", and "silver-carbon fiber composite"). When Hecht '008 teaches specifically about the formation of ceramics, such as carbides and nitrides, he refers to vapor deposition techniques, Col. 19, Lns. 2-11. The formation of a metal carbide by pressurless melt infiltration of a high melting point metal into a body of sacrificial CVD deposited carbon, but without reacting with the carbon fiber-carbon matrix composite reinforcements is not suggested or taught by Hecht '008. Hecht '008 recognizes no need for and makes no effort to protect the carbon fibers or the carbon matrix in which they reside from the molten metal infiltrant. Indeed, Hecht '008 wishes to provide more porosity so that the fibers are exposed to the infiltrant. Applying the teachings of Hecht '008 to high melting point carbide forming metals would result in an all carbide structure, and nothing in Hecht '008 informs the art how to achieve any other result.

Hecht's specific teachings with respect to fugitive (sacrificial) carbon (Col. 11, Lns. 46-58) are that fugitive fibers may be used to increase the porosity of the structure when it is carbonized.

The provision of a carbide matrix with an included composite carbon fiber-carbon matrix permits the unique properties of carbon fiber-carbon fiber composites to be applied to a carbide composite with very good high temperature properties.

There is no suggestion as to how to achieve this in Hecht '008. These properties are enhanced by the use of coatings on the carbon fibers (claims 2-4). The usefulness of the carbon fiber-carbon matrix reinforced ceramic composite is extended over a wide range of temperatures by permitting molten silicon to diffuse into the metal carbide matirx but substantially not into the carbon fiber-carbon matrix composite reinforcements (claims 5, 7, 11, 12, and 13). This is completely foreign to any teachings of Hecht '008. The use of carbon fiber bundles in the form of tows in the present method contributes to the structural integrity of some embodiments. The proportioning of molten infiltrants to the volume of voids is no where even hinted at by Hecth '008.

This application is now believed to be in condition for immediate allowance, and such action is respectfully solicited.

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